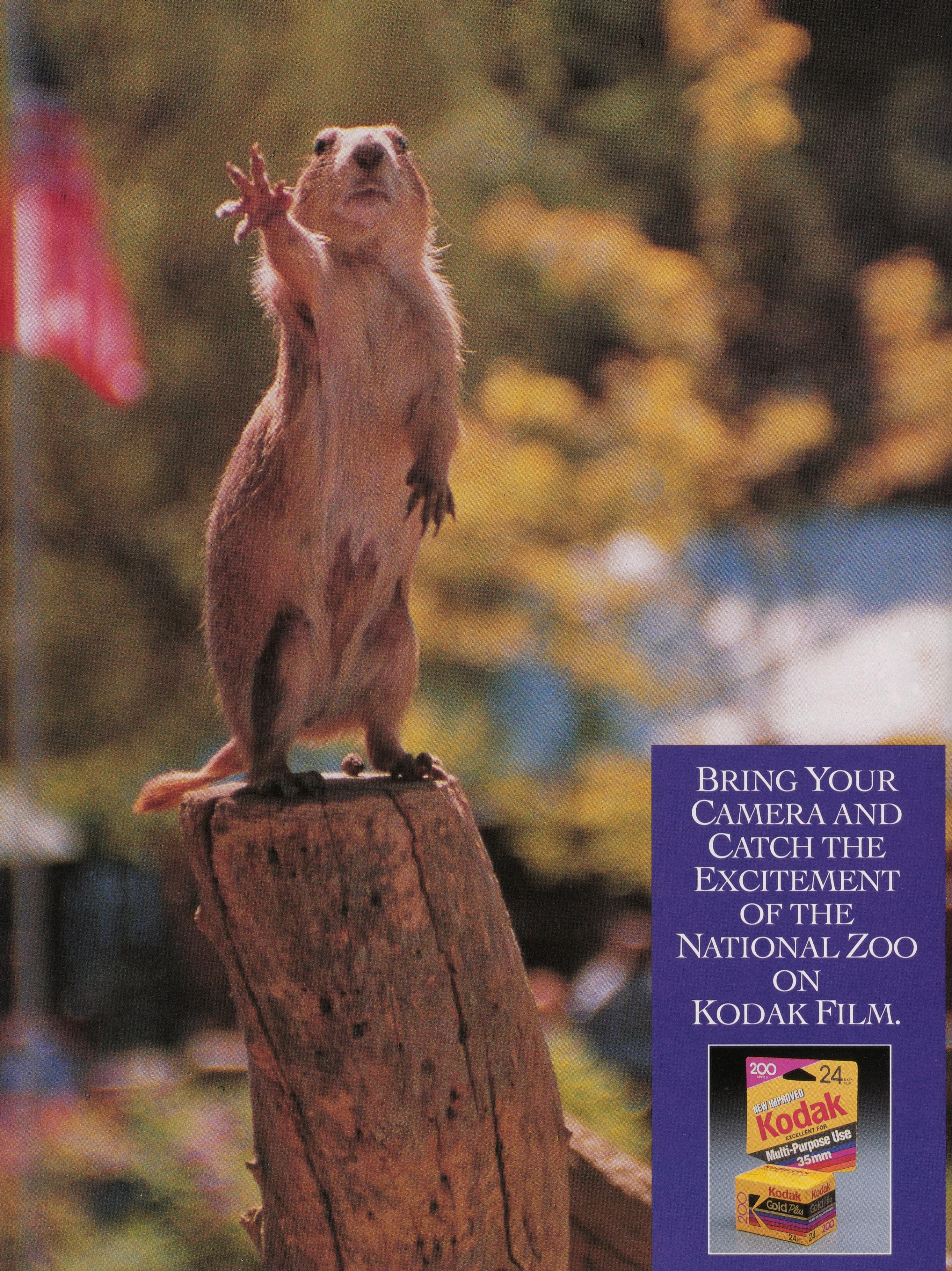


ZOOGOER

JANUARY • FEBRUARY 1994



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VOLUME 23 • NUMBER 1 • JANUARY • FEBRUARY 1994



Elephant Batik (Sri Lanka). From a private collection.
(John Seidensticker)

ELEPHANTS: SPECIAL SECTION

J E F F R E Y P . C O H N

The first elephant birth in the National Zoo's 105-year history provides occasion to reflect not only on the event itself, but also on the outlook for these amazing creatures that have fascinated humankind since our beginnings. And what better way to kick off FONZ's "Year of the Giants" than with an in-depth look at the world's largest land animals? A 16-page special section celebrates the birth of Kumari and the survival of these magnificent relicts from the Age of Giants. 9

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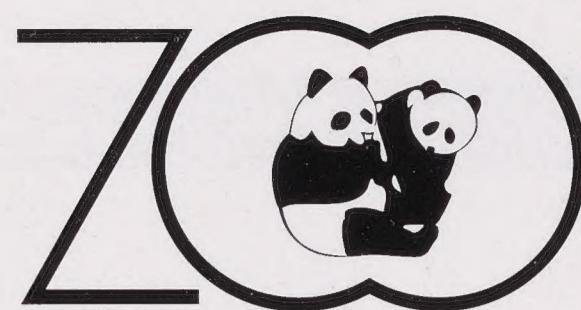
FEATURE

The Platypus: An Australian Enigma

David Salvesen

Looking like a strange mix of bird, reptile, and mammal, the platypus was once dismissed as a taxidermist's practical joke. But a group of persistent Australian scientists has gradually learned some remarkable things about this misunderstood and retiring animal. 25

**Friends
of the
National**



is a nonprofit organization of individuals, families, and organizations who are interested in helping to maintain the status of the National Zoological Park as one of the world's great zoos, to foster its use for education, research, and recreation, to increase and improve its facilities and collections, and to advance the welfare of its animals.

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Director: Michael H. Robinson.

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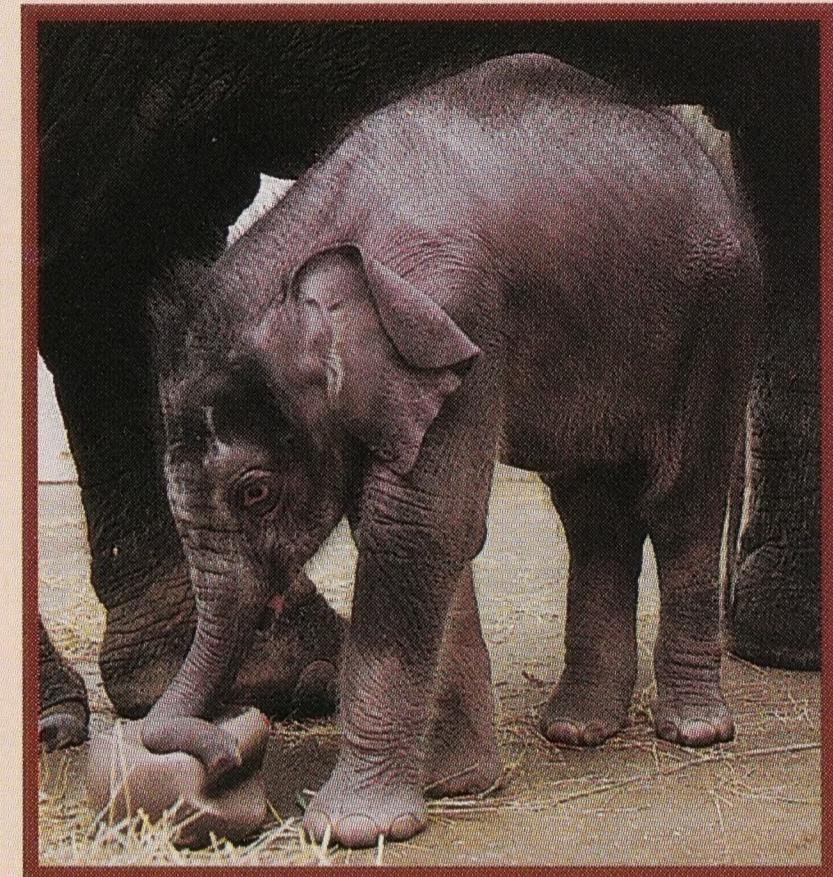
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Cover: Kumari, the first elephant born at the National Zoo in its 104-year history. (Jessie Cohen/NZP)

Kumari's Arrival

As I write this letter, everyone at the Zoo remains concerned about the Zoo's Asian elephant Shanthi, and her new baby, Kumari. But with each passing day, their prospects improve. The Elephant House is now open and I invite all of you to visit the Zoo's first-ever baby elephant.

For most of us, seeing a baby elephant is a delightful, once-in-a-lifetime experience. All babies are cute. But there is something especially disarming about a baby that weighs, as one observer put it, nearly as much as Joe Jacoby and is still only about one-thirtieth the size of its mother. Beyond this, however, this baby reminds us how close we are to losing the chance for anyone to see any kind of elephant anywhere. In Africa and in Asia, elephant numbers are perilously small, and room for these giants to roam continues to shrink. Zoo populations of elephants are essential backups to wild ones.



Jessie Cohen/NZP

Breeding elephants in zoos will never be easy. Zoo staff worked for years to find the best mate for Shanthi and to carry out the tricky logistics of sending her away to breed. Shanthi's pregnancy was closely monitored by Zoo scientists from the beginning. Toward the end, FONZ volunteers maintained all-night vigils so the first signs of Shanthi's labor could be reported. And since Kumari was born, keepers and curators have literally lived in the Elephant House, working day and night to care for Kumari and her mother. Rarely have I seen such profound dedication.

Whatever the outcome, Kumari's birth represents a significant milestone in the National Zoo's efforts to save endangered species. As Friends of the National Zoo, we should all be proud that our support helped make this achievement possible.

Sincerely,

Clinton A. Fields
Executive Director

Recycled paper, 10% post-consumer content.

GIANTS

On May 19, FONZ will host the biggest National ZooFari ever: GIANTS! ZooFari will highlight endangered animal giants and the National Zoo's conservation programs to help save such giants as elephants and Komodo dragons.

GIANTS will feature a huge number of restaurants serving their colossal fare, heavyweight entertainers putting on really big shows, a mammoth silent auction, a stupendous sweepstakes, and tons of fun—all on the immensely beautiful grounds of the National Zoo. The prodigious (we hope) proceeds will benefit the Theodore H. Reed Animal Fund. This

fund is used for conservation, education, and BioPark exhibition programs at the Zoo. Last year, ZooFari raised more than \$190,000 for these programs.

Tickets are expected to sell out for this gargantuan gala, so reserve yours today. Tickets are just \$85 for FONZ members and \$100 for the general public. Tables for ten are \$1,500, and tables for ten hosted by a zoologist are \$2,000. Call 202.673.4961 for tickets and information.

Seal Days

The National Zoo's California sea lions will be in the limelight at FONZ's annual Seal Days, set for Saturday and Sunday, March 5 and 6.



California sea lions at the National Zoo. (Jessie Cohen/NZP)

Among the Zoo's most popular residents, California sea lions (*Zalophus californianus*) are native to the Pacific coast, ranging from Vancouver, Canada, to Baja California, Mexico.

Living in large groups, these aquatic carnivores spend their days on sandy or rocky beaches and hunt for fish and cephalopods at night. California sea lions can swim up to 25 miles per hour—the fastest of the pinnipeds—and use sonar to navigate underwater. Easily trained in zoos, these sea lions are equally playful in the wild. They are often seen throwing and catching objects with their noses.

California sea lions were once hunted for blubber oil but are now fully protected by law. Scientists estimate their numbers at more than 200,000 animals, and say that the population is growing by at least five percent a year. About 40,000 Galapagos sea lions—a subspecies—exist in that island group. But a third subspecies, the Japanese sea lion, is believed to be extinct.

To learn more about sea lions and their marine habitats, come to the Zoo on Seal Days for a full schedule of special exhibits, films, tours, demonstrations, craft workshops, and even seafood

snacks. Most activities take place near the seal and sea lion pools in Beaver Valley. For more information, please call 202.673.4717.

Events Alert

FONZ and the Zoo will celebrate Easter Monday on April 4, and Earth Days on Saturday and Sunday, April 23 and 24. Look for more information about these annual events in your next issue of *Wildlife Adventures*.

Gardeners: Doo It!

You've ordered your seeds and plotted your plantings. So now's the time to supercharge your soil with Zoo Doo, FONZ's "homegrown" organic compost. Zoo Doo is made from the manure of the Zoo's herbivores—elephants, rhinos, bison, and others—mixed with straw, hay, grass clippings, and wood chips. And gardeners who use Zoo Doo agree that it makes gardens grow great! Zoo Doo is available in a variety of quantities, so whether you're planting the back forty or just a few pots, you can use Zoo Doo.

Ask about it at any Zoo Gift Shop or parking kiosk, or check out FONZ's new Garden Shop, scheduled to open for Seal Days, near parking lot D. Please call 202.673.4989 for more information.

From the Front Lines of the Rhino Wars

The rhinoceroses of Africa face a different battle for survival than many species threatened with extinction. In most cases, the preservation of species and of biological diversity in general is a matter of preserving habitat. However, "habitat is not the issue for rhinos," says Evan Blumer, director of animal health and science at the Fossil Rim Wildlife Center in Glen Rose, Texas, where some rhinos are being bred. "Rhinos are being lost purely to greed."

Poaching is the biggest threat to rhino survival in both Africa and Asia. The problem is massive in Africa: 65,000 black rhinos roamed the continent in 1970; today only an estimated 2,480 are left. Wildlife managers and government officials in Africa are attempting a variety of bold measures—involving everything from political pressure to high-technology experiments to Draconian laws—to protect the remaining rhinoceroses.

Rhino horns and hides are employed in Chinese medicine to treat fever and other ailments. And, men in the Middle Eastern country of Yemen carve the horns into

hilts for ceremonial daggers, or *jambias*. These uses fuel the demand for black-market rhino horns and motivate poachers with the sky-high prices the horns fetch. As a result, wildlife managers are getting a little desperate.

One controversial management method sounds a little like cutting off a rhino's nose to spite his defacers. In some African countries, managers are immobilizing black and white rhinos and sawing off their horns in hopes that the animals will thus become worthless to poachers. (Rhino horns are made of keratin, the major protein in hooves, nails, skin, and hair, and will grow back if knocked or sawed off.)

Some scientists worry that dehorning may have adverse effects on rhinos. Rhinoceroses use their horns to spar with each other, defend themselves and their young against predators, dig for water, and forage for food.

Joel Berger and Carol Cunningham, biologists at the University of Nevada-Reno, are studying the behavior of hornless black rhinos in Namibia, where the government began the dehorning effort in 1989. In the field since 1991, Berger and Cunningham have made

preliminary observations that suggest that female rhinoceroses cannot protect their calves from predators such as spotted hyenas as effectively without their horns.

In Zimbabwe, the behavioral ramifications of horn removal may be a moot point. In one experiment, 90 rhinos in a population of 120 animals were dehorned. Eighteen months later only six rhinos remained. Hornlessness didn't seem to deter poachers in the least.

Blumer suggests a few reasons for this, each more unsavory than the previous. It could be that, in the thick brush, poachers don't wait to see the whites of a rhino's eyes, let alone the tips of its horns, before shooting, realizing only when it's too late that the animal has no horns. Then again, a little bit of horn may be better than none at all to a needy poacher. It may also be that poachers feel they waste too much time tracking hornless rhinos and shoot them to get them out of the way. Or it could be an act of defiance, a poacher's message to a conservation-minded government that he will not be stopped so easily. Finally, it might be a willful, systematic attempt to elini-

nate rhinos, because once they are extinct, the value of remaining stockpiled rhino parts will skyrocket.

Rhinoceros protection has entered the electronic age. In Bophuthatswana, rangers now immobilize black rhinos and insert microchips encoded with unique identification numbers into their horns. If an animal is poached and the horn is confiscated by law enforcement personnel anywhere in the world, it can be traced back to its origin by passing a wand over the horn, in much the same way that the price of a dozen eggs is recognized electronically at the supermarket.

In Zimbabwe, wildlife managers use electronic tracking equipment in a more proactive manner. Scientists implant a transponder about the size of a roll of Lifesavers under the animal's skin. The transponder emits a signal that permits managers to track individual rhinos and plot their locations on a computer. If rhinoceroses wander into a region known to be a dangerous poaching area, rangers can step in and herd them back to safer ground.

Political action may also serve to protect the rhinocer-



Wildlife managers hope dehorning rhinos will help protect them from poachers. (Joel Berger)

os. Although four of the five rhino species are endangered and the fifth is threatened, and all five species are protected under the Convention on International Trade in En-

dangered Species (CITES), much work remains to be done. For example, CITES has no influence over domestic trade, and, until recently, such trade in rhino horn was

legal in Taiwan and China.

The United States has recently stepped up pressure on the two countries to regulate themselves. In September 1993, Secretary of the Interior

Bruce Babbitt cleared the way for President Clinton to impose trade sanctions on the two countries for obstructing United States environmental laws regarding trade in endangered species. Clinton, however, has deferred any action on the matter until March. Politics may be too slow to help.

According to Blumer, "The only solution for now is to rebuild the population in small, managed areas in what we call 'intensive protection zones'; they're not captive, but they're not really free." That may not be as easy as it sounds, however. Kenya has had some success with this approach, but funding is tied to the less than dependable income from tourism.

Blumer believes wild populations will be supplemented with zoo-bred animals. Rhinos are reproducing in zoos, but they have been succumbing to four or five bizarre diseases, according to Blumer. More research is needed in this area.

In the meantime, Zimbabwe has a shoot-to-kill policy for poachers that has claimed 200 lives since 1984. Still, in the last eight years, 1,170 rhinos have been poached in that country.

—Lisa Strong-Aufhauser

The Area Scene

Throughout the area, colorful cultivated crocuses are popping up through the snow in sunny gardens, signaling the first days of spring. Deep in wet woods, such as along Rock Creek, a native wildflower rivals crocuses for early flowering. The skunk cabbage (*Symplocarpus foetidus*) usually flowers in early March. The flowers resemble those of calla lilies. A rust-colored spathe, which looks like a leaf but isn't, enshrouds tiny golden flowers that cover a stiff projection called a spadix.

The spring's earliest flies and gnats are attracted by the strong odor of the flower (which also accounts for this plant's name). Slipping through the spathe's narrow opening, these insects sip the nectar and, at the same time, pollinate the flower. The skunk cabbage's spathe, spadix, and flower buds actually form underground in the fall. Then, as they begin to push up in late winter, they generate enough heat to thaw frozen soil and even snow or ice that might cover their beds. Brilliant green leaves as long as 18 inches do not appear until the weather warms later in the spring.

The Good News...

The good news is that the bad news about the state of the environment is starting to sink in. A Gallup International survey of people in 24

countries revealed that the majority of people in all but three countries believe that protecting the environment should be a high priority, even at the expense of economic growth. Among the industrialized nations, Denmark led the way, with 77 percent of those surveyed giving priority to the environment, while the U.S. came in at 58 percent. Mexico and Brazil led the developing nations with 71 percent each.

...The Bad News

Marine fish and other seafoods provide people worldwide with 16 percent of the animal protein they consume, and as much as 28 percent in Asian countries. But, after years of growth in the annual fish catch led to a 1989 peak of 86 million tons, catches have steadily fallen off. Nine of the world's seventeen major fishing areas are in serious decline. The rest are at or have exceeded the limits of their productivity. Commercial overfishing is the major culprit. Apart from its economic impact, the decline of marine fish disrupts entire ecosystems because of the fishes' key role in coastal and marine food chains.

From "Abandoned Seas," *Worldwatch Paper 116*, November 1993.

What's In a Name?

In November 1741, a Russian ship captained by Vitus

Bering wrecked on a frigid island off the coast of Siberia's Kamchatka Peninsula. That island, and the sea in which it lies, was later named in the intrepid explorer's honor.

The equally intrepid naturalist Georg Wilhelm Steller, a member of Bering's crew, is remembered in the names of several North American animals, including one he discovered on Bering Island. Steller's sea cow, or *Hydrodamalis giga* (literally, giant water calf), was a huge relative of dugongs and manatees, and, far more distantly, of elephants. Weighing between five and ten tons and reaching 26 feet in length, these placid giants lived in shallow waters and fed on kelp. Easy targets, their meat and oil kept Steller and the rest of Bering's shipwrecked crew, though not Bering himself, alive through the winter.

After the survivors told their tale, Bering and the few other islands off which sea cows grazed became favorite stopovers for hunters, who harvested the islands' furbearers and lived lavishly on the meat of sea cows. About 1,500 sea cows existed when Steller found them. By 1768—just 27 years later—Steller's sea cow was extinct.

Don't Recycle—Erase!

Ricoh, a major manufacturer of office equipment, expects to introduce a high-tech eraser sometime next year. The new machine is essentially an

"un-photocopier." Pages of photocopied text are fed into the machine and come out blank. The process loosens and melts the toner applied by photocopiers. Paper may be erased and reused up to ten times before it finally goes into the recycling bin.

From Audubon, January/February 1994.

Urban Animal Safari

The Washington metropolitan area provides ideal habitat for a variety of wild animal artistic creations. These lively, if inanimate, creatures range all over the region, from our most famous public places to the most secluded private lairs. Pictured here is one of these fantastic animals—do you know where to spot it? (Look for the answer in our March/April issue.)

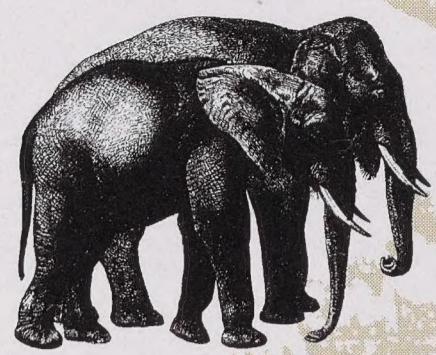
Answer to the November/December 1993 Urban Animal Safari: Outside the Silver Spring Metro station.



(Christy Bowe)



E L E P H A N T S



ELEPHANTS

J E F F R E Y P C O H N

Like a bashful child being introduced to relatives for the first time, Kumari stood between her mother's legs in the National Zoo's Elephant House. Protected by her mother's bulk, the 260-pound, week-old baby elephant moved cautiously as three other female elephants in the adjoining stall examined the newcomer.

"You're a good girl," John Lehnhardt, the National Zoo's assistant curator of mammals, told Shanthi, the Zoo's 18-year-old female Asian elephant and mother of Kumari. At that moment, Nancy, an African elephant and the matriarch of the Zoo's elephant group, reached over with her trunk to touch the baby. Perhaps feel-

ing a little more secure, Kumari took a few steps away from her mother, only to dash back underneath when a Nile hippo bellowed in the distance.

"Isn't she cute?" one observer gushed of Kumari. Elephants are massive, majestic animals, and cute is hardly a word one would normally use to describe them. The

Previous page: Kumari with Shanthi. (Jessie Cohen/NZP) **Right:** African elephant in Kenya. (Susan Lumpkin)





Only 600,000 elephants survive in Africa. (Susan Lumpkin)

largest living land animals, they are too big, too strange in appearance, and too clumsy-looking to be cute. Powerful or awesome are generally more apt words to describe them.

Somehow, though, this baby elephant is cute. Maybe it's the disparity in size between Kumari and her 8,600-pound mother, or perhaps it's a recognition of the youngster's precarious first few weeks, or it may merely be just the sight of her little trunk poking around Shanthi's legs.

To Lehnhardt, however, Kumari is more than cute. She is a milestone, the first elephant born at the National Zoo in its 104-year history. She was born on Tuesday, December 14, 1993, at 9:48 p.m., after Shanthi's 22-month pregnancy. The name Kumari means princess in Sinhalese, a major language of Sri Lanka, where Shanthi was born.

More important, Kumari is a symbol of efforts by zoos, conservationists, and governments to preserve elephants in a world

with too little habitat left and too much human desire for the ivory made from their tusks. "We are committed to elephants," Lehnhardt says. "They are endangered and their propagation in zoos is critical for their long-term survival."

Critical, indeed. Only an estimated 40,000 Asian elephants remain in the wild, down from about 150,000 in 1940. The reason: habitat loss as Asia's burgeoning human population takes over more land to feed itself, land that was once available to elephants and other wildlife.

Another 10,000 to 13,000 Asian elephants live in captivity, nearly all of them in Asia, where elephants have been trained to do work for more than 4,000 years. But even their numbers are declining. Much of the work previously done by elephants is now performed by machines. And, because most Asian countries list elephants as endangered, capturing them from the wild is illegal. Also, given the long gestation and childhood of elephants, few are born in captivity.

There are still about 600,000 African elephants in the wild. But their numbers have





dropped from an estimated 1.3 million in 1979. Five hundred years ago, Africa had 16 million people and 10 million elephants. The latter ranged over virtually all of sub-Saharan Africa and some were even found in the north. Today, with 500 million people in Africa, elephants occupy less than one-fourth of the continent.

The Problem of Poaching

As is the case in Asia, increasing human numbers in Africa have led to habitat loss and conflicts between farmers and elephants. But it is poachers who have had the worst effect on the African elephant population in recent years. They kill the animals, hack off their tusks, and sell them for their ivory, at one time for as much as \$114 a pound. The tusks are carved into exquisite figurines, personal name seals called *hanku* in Japan, piano keys and parts of other musical instruments, and hundreds of other trinkets.

Asian elephants have been poached for their tusks as well, albeit to nowhere near the same extent as African elephants. Asian females lack tusks and only some males



Working Asian elephants are slowly being replaced by tractors and other machines. (John Seidensticker)

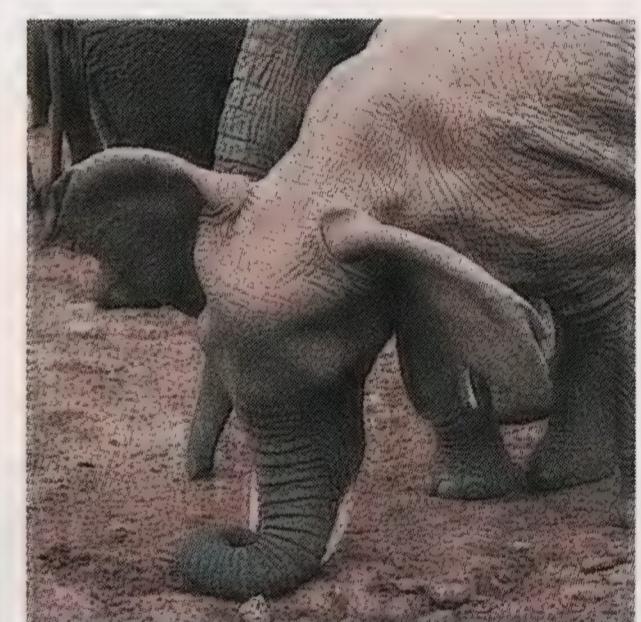
have them. Also, elephants are harder to find and shoot in Asian forests than they are on East African savannahs.

At poaching's peak in the mid-1980s, some 1,100 tons of ivory were smuggled out of Africa annually, says Ginette Hemley, director of the World Wildlife Fund/U.S.'s TRAFFIC, which monitors international wildlife trade. That translates into nearly 100,000 dead elephants a year. "It was absolutely out of control," Hemley states.

Beginning in the late 1980s, several U.S. and international conservation groups undertook a campaign to alert gov-

ernments and the public to the elephant's plight. Advertisements encouraged people not to buy or use ivory. Pictures appeared on television and in newspapers and magazines of dead elephants, their faces mutilated and their carcasses stained white from vulture droppings.

As a result, the United States Congress passed the African Elephant Conservation Act in October 1988. Using the act, then President George Bush banned ivory imports into the United States in June 1989. Several African nations had banned ivory exports the previous month. Most Western



A young African elephant at a salt lick in Kenya. (John Seidensticker)



European countries, Japan, and Hong Kong—the other leading ivory importers—soon followed suit.

Next, in October 1989, the 103 signatory nations to the Convention on International Trade in Endangered Species (CITES) declared the African elephant an endangered species and banned all trade in raw and worked ivory effective January 18, 1990. The Asian elephant was already listed as endangered, therefore making trade illegal.

"There was no way we could raise enough money to put rangers into the field to protect all the elephants," says Diana McMeekin, executive vice pres-

ident of the African Wildlife Foundation, one of the leading conservation groups advocating an ivory ban. "We had to cut off the market," McMeekin explains, adding, "We saw an immediate result as the word got out there would no longer be a market for poached ivory. It was almost as if someone had turned off a switch."

"The ban has been a major success," TRAFFIC's Hemley declares. "There was an almost complete stop in ivory leaving Africa." She cites reports from TRAFFIC field offices in Africa and Asia, as well as conversations with elephant researchers, government officials, and local inhabitants.

Still, as Hemley points out, some problems remain. Several African nations have large ivory stockpiles, most either left over after the ban or confiscated from poachers. Given political instability, Hemley worries that some could wind up in international trade. Also, reports of ivory smuggling increased in 1993.

Bouncing Back After the Ban

Despite these problems, the elephants themselves have appar-

ently noticed the effects of the ivory ban. "We went back to the same group of elephants we watched [in Tarangire National Park in Tanzania] for years," McMeekin says. "Before, they had always seemed nervous and in a hurry. They were always running in large groups."

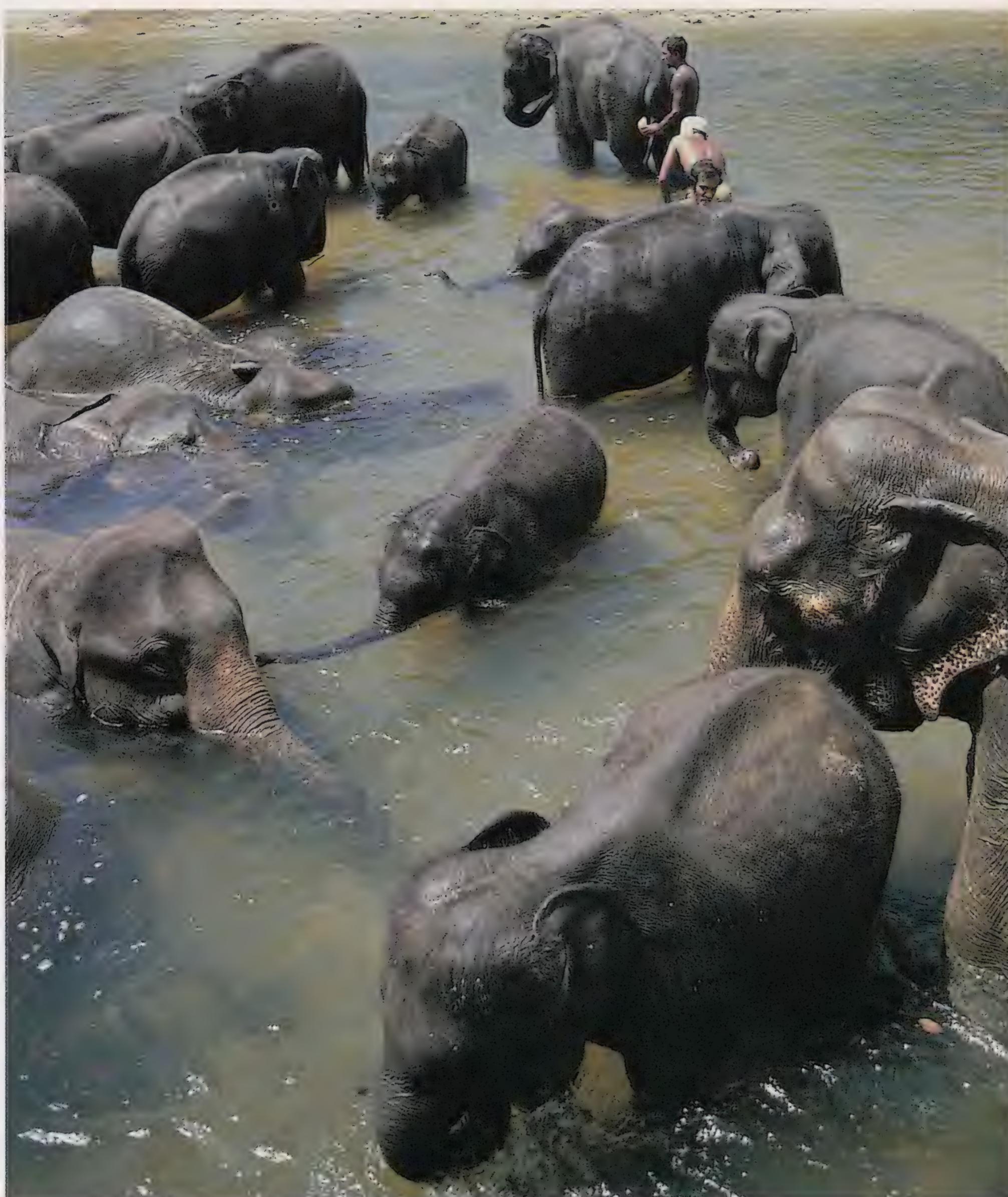
"Now we see the same elephants standing around in smaller groups," McMeekin continues. "There are even young ones present. The elephants are voting [for the ivory ban, which was renewed at the 1992 CITES meeting] with their feet."

While elephant numbers seem to have at least stabilized in response to the ivory trade ban, a new conservation technique developed in Zimbabwe gives hope that elephants might recover from poaching's effects more quickly than previously thought.

In Zimbabwe and several other southern African countries where poaching has not been as severe as it has been to the north, the problem has been one of too many elephants for the limited habitat to support. So, much to the consternation of many conservationists, wildlife managers

Baby elephants seldom stray from their herd's protection. (John Seidensticker)

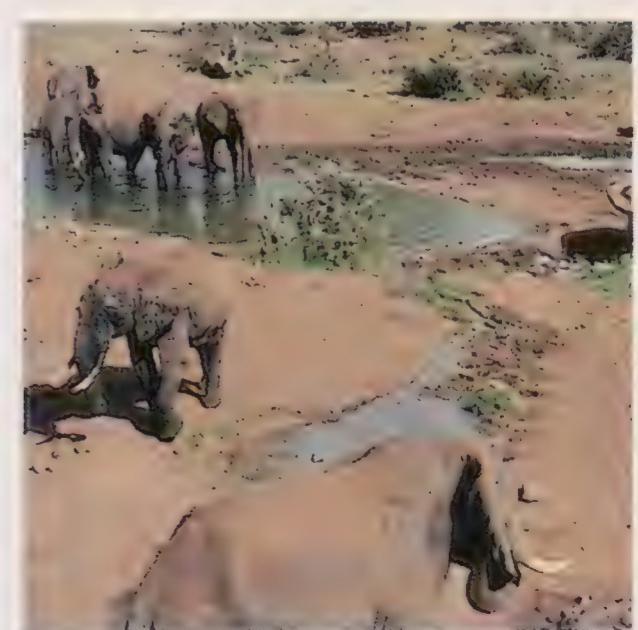


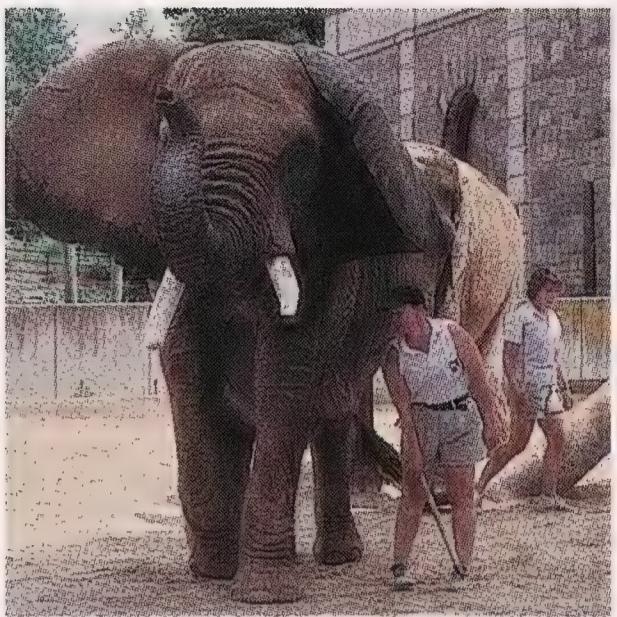


Elephants living in a Sri Lankan orphanage enjoy their daily bath. Shanti came to the Zoo from this same place.
(John Seidensticker)

Elephants profoundly affect their habitats. (Shirley Pollack)

Kumari is a symbol of efforts to preserve elephants in a world with too little habitat left and too much human desire for the ivory made from their tusks.





Keepers Cindy Sparks and Debbie Reaves during a training session. (Jessie Cohen/NZP)

in Zimbabwe occasionally culled their elephant herds, usually killing whole families. Local people shared the meat and profits from the culls.

The problem was particularly acute in 1991, when drought hit Gonarezhou National Park in southeastern Zimbabwe. The park then had about 5,000 elephants, but could support only an estimated 3,000, says Kenneth Stansell, deputy director of the U.S. Fish & Wildlife Service's (USFWS) Office of Management Authority.

Under the African Elephant Conservation Act, the USFWS awards grants mostly to African countries to help them

protect their elephants. The USFWS gave Zimbabwe \$200,000 to help support an ambitious effort to capture surplus elephants in Gonarezhou and relocate them to other parts of the country.

Since 1991, nearly a thousand elephants have been moved from Gonarezhou under the program managed by the Zimbabwe Department of Wildlife, Stansell says. Of those, only eight are known to have died. But, Stansell cautions, no one is currently following any released elephants. Many were so emaciated by the drought, he adds, that more deaths no doubt have occurred. Nevertheless, Zimbabwe is planning to move additional elephants this year, and may later relocate elephants from Hwanki National Park in the north to several Zambian parks where elephants have been eliminated by poachers.

A Complexity Proportional to their Size

Researchers, most notably Iain Douglas-Hamilton, Cynthia Moss, and Joyce Poole, have over the last two decades greatly expanded our knowledge of elephant social organization, behavior, communication, and ecological role. They have shown elephants to be far more complex and fascinating creatures than even their size had suggested.

Moss, for example, has found that beyond the immediate female-led family groups, elephant society consists of larger family units, even larger "bond" groups, and larger-still clans that together form an ever-widening circle of relations within a subpopulation or area.

In an ongoing study of elephants at Kenya's Amboseli National Park, begun in 1972, Moss has shown that families, bond groups, and clans often

Shanthi (left) and Nancy meet for the first time. (Jessie Cohen/NZP)





come together to feed, especially during the rainy season. During the dry months, they break up into smaller groups that forage separately. Sometimes, different family groups are led by related animals, further strengthening ties between them.

Moss has described elephant groups, separated even for short periods of time, showing great excitement at meeting again. The elephants run toward one another, touch trunks and click tusks, and rumble, snort, and exclaim in a wave of emotion that Moss interprets as joy.

Another discovery made by Moss, Poole, and their colleagues is that male elephants, who leave their family groups when they reach social and sexual maturity at about age 15, form loose-knit, all-male groups that may travel on the periphery of the female-led family units. Although the males usually do not mix with the families except when a female is in estrus, both males and females will come to each other's aid when threatened.

Other researchers have shown that elephants significantly affect their habitats. It



has long been known that elephants help spread the seeds of fruit by passing them through their dung. Now, scientists realize that their elephantine appetites (adults typically eat 300 pounds of food per day) have a bearing on the ecology of whole regions.

In their near constant search for food, elephants trample underbrush, uproot small trees, and strip larger trees of bark, branches, and leaves. In Central and West Africa, this activity opens

spaces in dense rainforest to allow growth of ground vegetation favored by gorillas and hoofed animals. In East Africa, it helps change woodlands into savannahs, thus increasing the ranges of zebras, wildebeests, and gazelles.

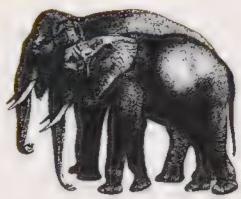
In areas where poaching has reduced the number of elephants or eliminated them altogether, trees regrow, changing savannahs into bush, bush into woodlands, and woodlands into forest. The result, says David Western, head

The National Zoo's adult elephants line up during their daily training session.
(Jessie Cohen/NZP)



Nancy, the National Zoo's
African elephant. (Lisa
Strong-Aufhauser)

While most work remains focused on wild populations, North American zoos have redoubled their programs in recent years to breed and study elephants in their institutions.



of the New York Zoological Society/The Wildlife Conservation Society's Nairobi office, could be the disappearance of grazing animals from "some very important areas that are now grassland."

Elephantine Communications

Perhaps the most interesting research findings were those announced in 1989 by Katharine Payne and William Langbauer. The two are wildlife biologists in the Bioacoustics Research Program at Cornell University's Laboratory of Ornithology in Ithaca, New York. They found that elephants use low-frequency infrasound to communicate with each other. Natural phenomena such as earthquakes, thunder, volcanoes, and storms create infrasound, but this is the first instance in which animals have been shown to produce and communicate with these low-frequency noises.

In research that started at the Washington Park Zoo in Portland, Oregon, in 1984, and later expanded to three African parks, Payne and Langbauer showed that elephants can pass air through their nasal passages to produce low-pitched

sounds. The sounds are often below the range of human hearing. Because they are low-pitched, the sounds travel great distances, sometimes two and a half miles or more.

Payne and Langbauer set up microphones around a water hole in Namibia's Etosha National Park to record the elephants' sounds and their effects on the behavior of both individuals and groups. The scientists noticed that when one or more elephants produced infrasound, other elephants stopped and listened intently, their ears fully opened to catch the low sounds.

In one experiment, Payne and Langbauer played recorded sounds made by an adult female in estrus. On hearing the sounds, two nearby bulls stopped drinking at the water hole, listened for a minute or two, then took off in a brisk walk toward the sound. Eventually they walked right past the van from which the taped sounds were emanating.

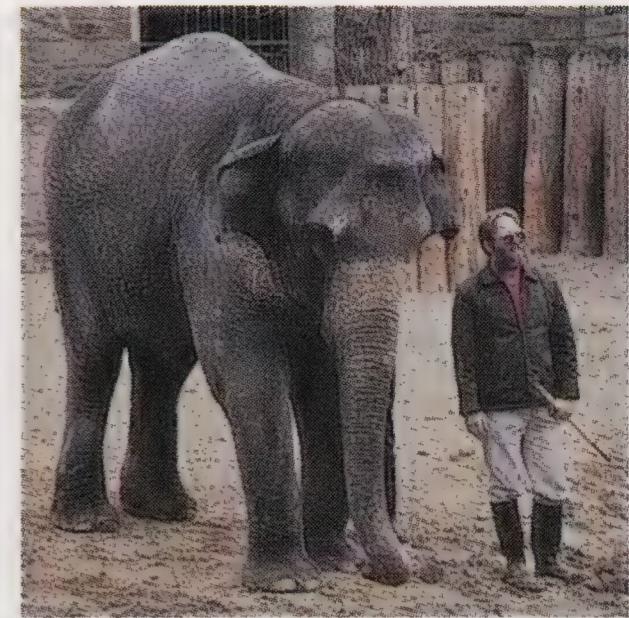
Such studies may help explain the coordinated movements researchers have observed among widely dispersed elephants. Reports from Zimbabwe, for example, record

times when different elephant families, although out of sight and apparently out of contact with each other, nevertheless moved in the same direction, even to the point of turning the same way simultaneously.

Meanwhile, elephant research and conservation efforts have not been limited to Africa and Asia. While most work remains focused on wild populations, North American zoos have redoubled their programs in recent years to breed and study elephants in their institutions.

Breeding in Zoos

Elephants have long been a favorite of zoogoers. As of January 1, 1994, 157 Asian and



Toni with the National Zoo's assistant curator of mammals John Lehnhardt.

(Jessie Cohen/NZP)

Kumari underneath Shanti. (Jessie Cohen/NZP)





Shanthi, the Zoo's new mother elephant. (Jessie Cohen/NZP)

152 African elephants reside in 79 North American zoos. Another 200 Asian and 100 African elephants are in circuses and other private collections. Worldwide, some 1,200 Asian and 750 African elephants are exhibited in zoos.

The National Zoo received its first elephants, two Asians named Dunk and Gold Dust, in 1891, just two years after the Zoo was chartered. But, for decades, most zoos displayed only a single elephant.

Elephants were too big and costly for individual zoos to keep a group.

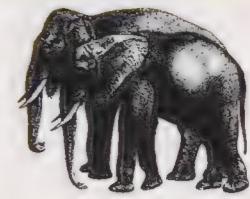
Moreover, male elephants were rarely exhibited. Not only are they larger than females, but males past age 30 experience an annual condition called musth, in which their testosterone levels rise and the animals become aggressive and difficult to handle. As a result, only eight Asian elephants were born in United States zoos before 1962.

For many years it was easier to import elephants from Asia or Africa than to breed them, says the National Zoo's John Lehnhardt. As awareness of the plight of elephants in the wild increased, however, so did interest in breeding the animals in zoos. Since 1962, 80 Asian and 13 African elephants have been born in North American zoos.

Further, the American Association of Zoological Parks and Aquariums created a



At age 46, Ambika is the oldest of the Zoo's five elephants. (Jessie Cohen/NZP)



Species Survival Plan (SSP) for Asian elephants in 1985, and added African elephants in 1990. Under the plan, zoos cooperate to institute breeding programs, undertake research, and manage the elephants as one herd. Unfortunately, only about half the elephants in North America are included in the SSP at the moment, Lehnhardt says.

The leader among zoos in elephant breeding and research has been the Washington Park Zoo in Portland, Oregon. The Portland zoo features a one-and-a-half-acre yard, a specially built elephant house with thick concrete walls, and hydraulically operated squeeze-stalls that allow keepers to work closely with their charges.

Since 1962, the Washington Park Zoo has recorded 25 births, all of Asian elephants, more than any other U.S. facility. The zoo now has eight Asian elephants, including three males.

More important, scientists at the Portland zoo have been working on ways to artificially inseminate female elephants, says Michael Schmidt, the zoo's veterinarian. Working with researchers from the

St. Louis, Indianapolis, and National zoos, among others, Schmidt has learned how to measure levels of progesterone, the main female sex hormone, and to correlate those levels with a bull's behavior to predict when a cow is in estrus.

More recently, Schmidt has fed the zoo's female elephants tiny radio transmitters hidden in gel capsules. The transmitters relay information on the elephants' body temperature. As with human females, a female elephant's temperature rises when she is ovulating. The transmitters give keepers a better means to coordinate collecting sperm from a male for artificial insemination, Schmidt says.

"Artificial insemination would be a boon for breeding elephants in zoos," Schmidt adds. "It would allow some zoos to serve as breeding centers while saving others the cost of sending their females to zoos with males. We might even someday be able to fly semen in from Asia."

Despite the research advances, however, no elephant has yet become pregnant from artificial insemination. In fact,

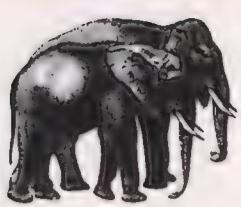


the St. Louis Zoo tried artificially inseminating its Asian females a dozen times beginning in the mid-1980s before sending two of them to the Dickerson Park Zoo in Springfield, Missouri, in 1990 to mate with a male. The result was a naturally conceived baby elephant born in St. Louis in 1992, the zoo's first.

Shanthi and Kumari

Closer to home, the National Zoo and FONZ together spent more than \$20,000 to breed Shanthi. The Zoo shipped Shanthi to the Burnet Park Zoo in Syracuse, New York, in 1991. "I wanted to send her to a zoo with a proven breeder," Lehnhardt says.

Kumari nursing in the Elephant House. (Jessie Cohen/NZP)



**Kumari with her favorite
squashed rubber ball.**

(Jessie Cohen/NZP)



Kumari. (Jessie Cohen/NZP)

“We are committed to elephants,”
Lehnhardt says. “They are endangered and
their propagation in zoos is critical for their
long-term survival.”



But, if National and Burnet Park keepers expected love at first sight, they were disappointed. "Shanthi had never seen a bull before," Lehnhardt says. "She was not totally enamored of Indy [the Burnet Park Zoo's male] at first." Eventually, Shanthi did become "enamored" and actually pursued Indy when in estrus.

The resulting pregnancy was exciting but worrisome, Lehnhardt admits. "First births are always difficult," he says. Indeed, 17 percent of first-born elephant calves in zoos have been stillborn, and 27 percent have died in the first month. In addition, 3 of 41 females that have given birth have themselves died.

If Shanthi's pregnancy was worrisome, the same can be said of Kumari's first two months. "We were worried since day one how this baby would fare," Lehnhardt says. "We have had a series of obstacles to overcome."

For one, Shanthi stepped on Kumari and kicked her shortly after birth. Lehnhardt speculates that Shanthi did not recognize Kumari as a baby. Or, perhaps kicks are how elephant mothers get newborns on their

feet, says Michael Keele, an assistant curator at the Washington Park Zoo. Whatever the reason behind them, the blows left Kumari with a bruised head and shoulder.

Moreover, Shanthi produced too little milk at first, perhaps because her body failed to expel the placenta after birth. The placenta's continued presence, Lehnhardt says, may inhibit hormone production that tells the elephant's mammary glands to produce milk. To add insult to injury, Kumari refused to take milk from a bottle, causing her to lose weight.

More seriously, because Shanthi was producing too little milk, Kumari did not get sufficient colostrum at first. Colostrum is a fluid secreted by the mammary glands after birth that transmits antibodies from the mother to her newborns. Fortunately, Lehnhardt and his staff had collected blood samples from Shanthi immediately before and after Kumari's birth. Antibodies were separated from Shanthi's blood, concentrated, and injected into Kumari intravenously a few days later.

So far, Kumari has weathered her ordeal remarkably

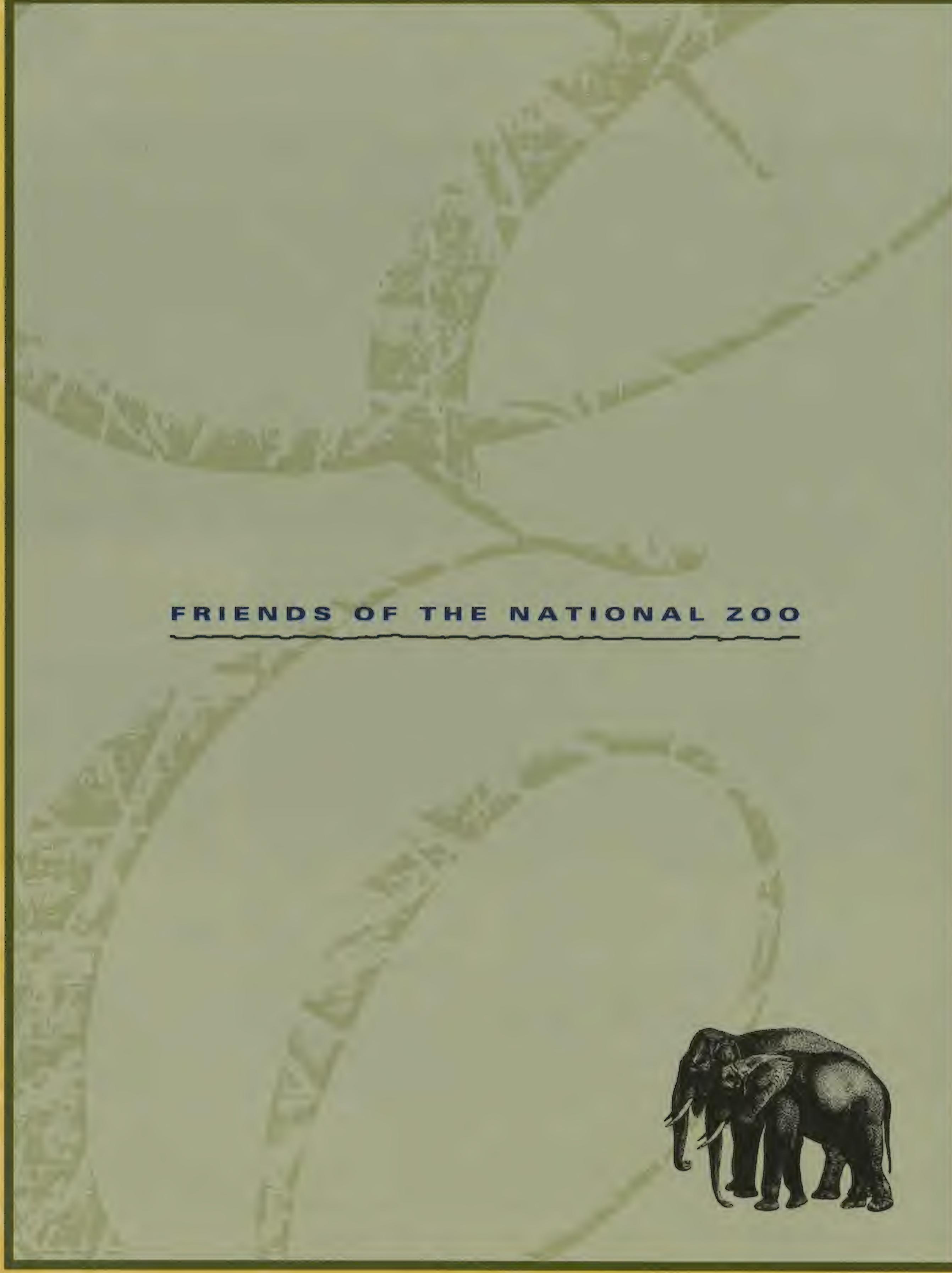


well. "We're cautiously optimistic," Lehnhardt says, adding, "What we are learning from Shanthi and Kumari will directly relate to how both zoo and wild elephants are managed."

"This birth is not an end point," Lehnhardt states. "Whether it is a success or failure, we expect to continue mating Shanthi until she has two living offspring. It is very important to the future of elephants that her genes are passed on to the next generation. That could take 20 years, but we are in this for the long haul." ♣

Jeffrey P. Cohn is a freelance writer specializing in conservation subjects.

**Kumari greets keeper
Marie Galloway. (Jessie
Cohen/NZP)**



FRIENDS OF THE NATIONAL ZOO



The **AN AUSTRALIAN ENIGMA**

platypus

On the sandy banks of the Shoalhaven River in southeastern Australia, Tom Grant hunches his wiry body over a makeshift operating table, readying himself for his next wary patient, a 3.8-pound platypus known simply as Number 540. Like a country doctor, Tom works wonders with the Spartan facilities: a card table, two lawn chairs, a kerosene lamp, a pair of scissors, a razor, a box of Kleenex, a bottle of rubbing alcohol, and a few cold and weary volunteers.

Methodically, he drones out vital measurements—length, weight, bill size, and length of spur—and inserts a tiny transponder in the animal's upper back, just beneath its fur. The transponder is a high-tech tagging device that allows scientists to readily identify the platypus the

next time it is caught, by waving an ultrasound scanner over its back in much the same way that groceries are scanned at the checkout counter.

Number 540, who earlier escaped from his holding bag and was caught again, waits as Tom squeezes the last drop of venom from each of his two spurs, located on the ankles of his hind limbs. The hollow spurs, which are found in young platypuses and adult males (females' spurs degenerate by adulthood), reach about a half inch in length and connect via a duct to a venom gland in the thigh.

Adult males apparently wield the potent spurs during turf battles against rivals. Although extremely painful to humans, the platypus venom is not lethal. Finally, we set Number 540 free and call it an evening. With a few quick strokes



Platypus in the wild. (D. Parer and E. Parer-Cook/AUSCAPE)

DAVID SALVESEN



of his webbed forefeet, he disappears into the black, still water. It is 3:15 a.m.

Over more than 20 years, Tom Grant and his merry band of platypus enthusiasts have captured, tagged, and released more than 600 platypuses. His research continues to shed new light on this shy and secretive creature. "We've been coming to these same pools year after year, and every time we discover something new," Tom remarks. For example, through his work we now know that the platypus's average life span is about 12 years in the wild, and that it can regulate its body temperature. "People once thought that, like reptiles, platypuses came out of the water periodically to warm up," he says. He has written a book entitled simply, *The Platypus*.

Several times a year he returns to the same quiet stretches of the Shoalhaven River for three nights of field research (platypuses are nocturnal). I had the privilege of tagging along on one of his recent excursions.

Mammal or Reptile?

Few animals stand out as taxonomic misfits like the platypus. With webbed feet, ducklike bill, and thick, soft fur like a muskrat, the platypus would seem to be a bizarre mix of bird, reptile, and mammal. It lays eggs, yet rears its young on milk. When the first platypus specimen arrived in England in 1798, scientists at the British Museum in London thought it was a hoax, a practical joke from an Australian taxidermist. "They thought someone fastened a duck bill to a rodent," says Tom Grant with a laugh. Scissor marks from where scientists cut away the bill they thought was glued on can still be seen on the original skin preserved in London's Natural History Museum.

For nearly a century after it was first spotted by Europeans in the late 1700s, the platypus defied easy classification. The presence of both mammalian and



Venom-carrying ankle spur of adult male platypus.
(Ford Kristo/Animal Image)

reptilian features baffled zoologists. Prominent European scientists debated whether the platypus was indeed a mammal or whether it should stand in a class by itself. Some steadfastly refused to believe that a mammal could lay eggs.

Finally, in 1884, the debate was settled when W.H. Caldwell, while searching with the help of Aborigines along the Burnett River in Queensland, found a female platypus that had just laid an egg and had another in its oviduct. Caldwell, a young biologist from Cambridge studying in Australia, dispatched a succinct telegraph to the Annual Meeting of the British Association for the Advancement of Science, in Montreal, which read, "Monotremes oviparous, ovum meroblastic." In other words, the platypus lays eggs.

Although it does not fit unambiguously into any category, the platypus (*Ornithorhynchus anatinus*) qualifies as a mammal due to the presence of mammary glands. Unlike most mammals, however, platypuses lack nipples. Instead, milk oozes like sweat from mammary glands scattered over the female's abdomen.

The platypus occupies, along with its Australian and New Guinean cousins the echidnas, or spiny anteaters, the order Monotremata. Monotremata means "one-holed creatures," and refers to the animals' common opening, called a cloaca, for both reproduction and excretion. (Marsupials also possess a common opening like that of the monotremes, but they do not lay eggs.)

The platypus belongs to the family Ornithorhynchidae. According to Tom Grant, the platypus was originally called *Platypus anatinus*, meaning flat-footed, ducklike animal. But the word platypus had already been used to name a group of beetles, so its name was changed to *Ornithorhynchus* (birdlike snout) to avoid confusion. The Aborigines call the platypus mallingong, boondaburra, and tambreet.

An Aquatic Specialist

The platypus is smaller than most people envision, about the size of a small housecat. Males average about nineteen and a half inches in length and weigh only



Platypus in its underwater habitat. (Ford Kristo/Animal Image)

about three and a half pounds; females are generally smaller. The largest platypus ever recorded stretched just under two feet and weighed more than five pounds.

Found only in eastern Australia, the platypus inhabits freshwater streams, rivers, and lakes from Queensland south to the island of Tasmania, living in burrows along the banks. Its burrows usually lie just above water level and typically extend about 20 feet in length, although some reach as long as 60 feet.

During mating season, females dig longer, more complex breeding burrows and line them with wet leaves and grass. Mothers usually lay two or three grape-sized eggs. While incubating the eggs, the female platypus builds an earthen plug to seal herself inside the burrow until the eggs hatch about 12 days later. Fat stored in her flat, furry tail helps sustain her through this period of fasting.

Hatchlings emerge blind, furless, and helpless, but by the end of three months, they are ready to leave the burrow and fend for themselves. When leaving to feed, and upon returning, mothers reportedly plug burrow entrances with loose soil to protect the young from predators such as snakes.

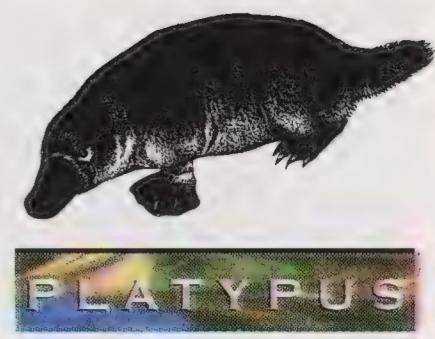
The platypus is a voracious feeder, consuming about one and a half pounds of food per day. It feeds mostly at night, foraging along the bottom of streams and lakes in search of insect larvae, shrimp, tadpoles, snails,

and small frogs and fish, which it stores in cheek pouches. After a minute or so underwater, the platypus rises to the surface to "chew" its food between horny pads on its upper and lower jaws (the platypus loses its teeth soon after emerging from its burrow). It can stay underwater for as long as five minutes.

Despite its rather primitive appearance, the platypus is supremely adapted to its aquatic environment. With short, stout limbs and webbed feet, the platypus moves through the water with ease. Unlike amphibians, which use their back limbs to propel themselves through the water, the platypus uses its front limbs to do all the work. Its back limbs, which are only partially webbed, act as rudders. This "rear-wheel steering," like that of a forklift, provides excellent maneuverability. Moreover, when digging its burrows, the webbing on the platypus's feet folds back, exposing sturdy claws.

Like an alligator, the platypus has nostrils located on the top of its snout, allowing most of its body to remain hidden underwater when it surfaces for air. Narrow grooves behind the bill on each side of the head house the ear openings and eyes. When diving, platypuses close their eyes, ears, and nostrils.

Blind and deaf underwater, how does the platypus locate its prey? The answer lies in its remarkable bill, which resembles a duck's bill in appearance but is soft, leathery, and far more sophisticated. Electroreceptors in



The platypus inhabits freshwater streams, rivers, and lakes in eastern Australia. (Ford Kristo/Animal Image)



Platypus emerging from its burrow. (Ford Kristo/Animal Image)

the platypus's bill can detect minute electrical discharges generated by muscle activity of prey animals. The receptors enable the platypus to locate prey even in the murkiest of waters. It is not clear, however, whether platypuses can also detect stationary objects like rocks and twigs underwater (perhaps they peek occasionally).

The platypus's thick, waterproof fur keeps it warm during prolonged periods in cold water. Unfortunately, the fur was once treasured for coats and rugs, and extensive trapping greatly reduced platypus numbers until the animal was protected by laws enacted around the turn of the century. Although seldom seen, the platypus is no longer considered endangered.

More Trout than Platypuses

We pitch our floorless canvas tents at the edge of a large ranch that abuts the Shoalhaven River, a few miles from the small town of Braidwood (population 3,000). Cattle and sheep graze nearby. Canberra, the nation's capital, lies about an hour's drive west. Here, not far from its source, the Shoalhaven meanders through flat to rolling ranch country before slicing through the steep gorges of Morton National Park, about 45 miles to the north, on its 100-mile journey to the Tasman Sea.

At about 7:00 p.m., we stretch gill nets through the river, parallel to the bank, then sit back in our lawn chairs and wait. Like spiders waiting for careless insects to happen by, we wait patiently for the cautious platypuses to venture out from their protective burrows and into our nets.

To pass the time, Jackie Watson, a geneticist from Latrobe University in Melbourne, smokes hand-rolled cigarettes and discusses her research. Jackie is here as an observer. Her real work begins back at the university, where she analyzes familial relationships among platypuses by examining their DNA (obtained from culturing tiny slivers of toe webbing). Through her research she hopes to determine, for example, whether a dominant

male is responsible for most of the offspring in a particular area, or whether males and females are more promiscuous, wandering from pool to pool to mate.

We are joined shortly by Mervyn Griffiths, a retired wildlife biologist and author of *The Biology of the Monotremes*. Now in his seventies, Griffiths has studied monotremes for nearly half his life. His specialty, his passion, is the milk of echidnas and platypuses. "It's very rich milk," he observes. "It makes human milk seem like piss in comparison." Studying the milk of monotremes is a bit like studying giant pandas—the supply is very scarce. Griffiths must obtain his milk from wild platypuses, one vial at a time, a painstaking process because a lactating platypus, when squeezed, will yield only about a teaspoon of milk.

Temperamental and easily stressed, platypuses do not fare well in zoos or laboratories. They are sensitive to light, noise, and excessive handling. Only one platypus has been born outside the wild. For these reasons, and because platypuses spend their days sleeping in burrows, they do not make ideal candidates for zoos. In fact, according to Kim Hastings of the International Species Inventory System at the Minnesota Zoo in Apple Valley, Minnesota, except for a few zoos in Australia, live platypuses are not exhibited anywhere in the world. In 1947, however, three platypuses were taken from Australia to the New York Zoological Park: one died within six months, but the others lived for 10 years.

Periodically, we check the nets and remove snags, trout, and anything else that becomes entangled. If the nets become heavy with debris, captured platypuses may have difficulty surfacing and could drown, although this rarely happens. In 20 years, Grant has lost only two platypuses, both juveniles.

At about 9:00 p.m., Griffiths heads for the comfort of his pickup truck, where he has installed a single mattress and blankets inside the cab. Before bidding us goodnight, he warns, "Don't wake me unless you've got a lactating female."

The first platypus, a healthy male, hits the net at about 9:15 p.m. After a cursory inspection, he is



A platypus caught during Tom Grant's study. (Ford Kristo/Animal Image)





A platypus foraging for food in Tasmania. (D. Parer and E. Parer-Cook/AUSCAPE)

placed in a burlap bag where he will lie quietly for several hours before being processed. Tom explains that if he were to release him before the nets are taken in, he would soon be captured again. So, there he waits until we take in the nets. A few, like Number 540, occasionally escape from the bags.

Two more platypuses, both females, arrive well after midnight. One is lactating, and as if on cue Griffiths mysteriously appears, hoping for a few more drops of white gold to sustain his research. Later, while the platypus is being handled during processing, he importunes Tom to squeeze a few more drops from the mother.

At 1:30 a.m., we haul in the nets and set to work on the restless monotremes. The evening's tally: three platypuses, seven trout, one eel, two turtles, and a half-dozen sticks. Not bad for a night's work.

Outback Cuisine

During the day we discuss the night's catch and feast on brown trout (an introduced species brought to Australia many years ago), canned fruit and vegetables, and lots of coffee and vintage Australian wine. Griffiths shuns the trout, the taste of which he likens to "greasy sawdust," and opts instead for a precooked chicken, or "chook." Bushflies swarm over our food. Unattended plates quickly disappear beneath a mass of hungry flies. A layer of drowned flies floats inside opened cans of

fruit. I learn to eat quickly while constantly fanning my plate to avoid ingesting flies by the mouthful. These are not meals for the faint of stomach.

We wander along the Shoalhaven as Tom comments on how the morphology of the river has changed dramatically over the past year. Overgrazing by cattle and sheep—John Muir called them hooved locusts—has led to increased erosion. Huge banks of sand have amassed along the river's edge. Many of the pools have filled with sand, reducing the quality of platypus habitat.

That evening we caught five more platypuses and about six trout. No one felt excited about the prospect of eating more trout, so we released them. Later that night, long after the Southern Cross had reached its zenith, I was rewarded for all my waiting and watching. I was asked to release the last platypus. As I admired this wondrous creature, fur soft as a kitten's, eyes of black onyx, and its mystifying bill, I understood how scientists in London were fooled.

Holding the squirming platypus by the tail, mindful of its spurs, I released the irritated and anxious creature into the waiting Shoalhaven. His ordeal was over. His legs were already in motion before he hit the water. In a splash, he was gone. Eyes, ears, and nostrils shut, front feet flailing, he was home again. ♦

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